

Studies of PMSE and NLC Layers in the Common Atmospheric Volume Above the EISCAT Tromsø Site

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The summer mesopause (80-90 km) is a region of the atmosphere where temperatures fall down to their minimum values of 130 K and less. This unique environment provides favorable conditions for the formation of layers of neutral ice particles, seen from the ground as Noctilucent Clouds (NLC), as well as layers of charged ice particles, registered with radars as Polar Mesospheric Summer Echoes (PMSE). These phenomena are also influenced by neutral atmospheric dynamics, turbulence and dusty plasma effects, and their exact formation conditions are still subject to investigations. We present results from a number of simultaneous observations above the same location of the both phenomena.

Two campaigns were conducted in August of 2015 and of 2016 aiming to study PMSE and NLC activity in the common volume of the atmosphere above the Tromsø EISCAT station. While EISCAT VHF (224 MHz) and UHF (930 MHz) radar were operating at Tromsø, two optical automated cameras, located at Kiruna and Nikkaluokta (Sweden), registered a potential occurrence of NLCs above the radar site. Both locations of the NLC cameras are about 200 km south of Tromsø, which permits making NLC triangulation measurements and hence estimating NLC height and dynamics in 3D space.

Our results are ranging from full coincidence, partial coincidence to no coincidence at all. Observational data and peculiar dynamical features intrinsic to PMSE and NLC layers are discussed.